## REMARKS

Upon entry of this amendment, claims 27-41 are pending. Claims 27-32 have been amended. New claims 33-41 have been added.

No new matter has been added, and support for the amended and new claims can be found the application as filed. Thus, the application is believed to be in condition for allowance. Reconsideration of the application is respectfully requested.

In the Office Action, the Examiner:

- objected to claim 27 as having informalities in the form of a typing error in line 14, and lack of an issued patent number corresponding to application designation "09/950,227" on specification page 1;
- rejected claims 27-28 and 30-32 under 35 U.S.C. 102(e) as anticipated by U.S. Patent No. 6,451,681 to Greer ("the Greer patent");
- rejected claims 27, 28 and 31 under 35 U.S.C. 102(e) as anticipated by U.S. Patent No. 6,528,881 to Tsuboi ("the Tsuboi patent");
- rejected claim 29 under 35 U.S.C. 103(a) as being unpatentable over "the Greer patent taken with U.S. Patent No. 6,620,720 to Moyer ("the Moyer patent");

### Objections

The examiner objected to the application as having the following informalities: (1) in claim 27, "... at least on contact pad ..." should read "at least one contact pad;" and (2) on specification page 1, information of parent application Serial No. 09/950,227 should be updated to include U.S. Patent No. 6,605,524.

Applicants have corrected the spelling error in claim 27, and have amended the specification to include reference to issued patent no. 6,605,524.

### Rejections

#### 35 U.S.C. §102(e)

##### Claim 27

The examiner rejected claims 27-28 and 30-32 under 35 U.S.C. §102(e) as anticipated by the Greer patent. Claim 27 has been amended to recite, *inter alia*:

> "... at least one contact pad provided on [a] substrate ... a layer of passivation ... at least one layer of seed material ... at least one layer of

> Under Bump Metal ... at least one layer of solder material having a solder height ... a layer of polymer coated ... to a polymer thickness, said polymer thickness being less than said solder height by a measurable amount, said polymer contacting said layer of solder material over a substantial portion of the thickness of the polymer layer ...."

The Greer patent does not anticipate claim 27 because it does not disclose, teach or suggest a "... layer of polymer ... said polymer contacting said layer of solder material over a substantial portion of the thickness of the polymer layer ...." Rather, the Greer patent discloses a "pad limiting metal (underbump) layer **314** ... formed within the die coat opening" in the polyimide **302**. (*See* Greer patent, col. 4, lines 37-40 and Figs. 3, 6). Bump material, such as lead tin solder is deposited over the pad limiting metal layer **314** to form the conductive bump **310**. (*See id.*, col. 4, lines 59-63). As can be seen in Figures 3 and 6 of the Greer patent, the conductive bump **310** does not contact the polyimide layer **302** at any point, but rather contacts the pad limiting metal layer **314**. (*See id.*, Figs. 3 & 6).

Likewise, the Tsuboi patent does not anticipate claim 27 because it does not disclose, teach or suggest a "... layer of polymer ... said polymer contacting said layer of solder material over a substantial portion of the thickness of the polymer layer ...." Rather, the Tsuboi patent discloses a polyimide sidewall **16, 23** that either does not contact the solder ball **24** (*see* Tsuboi patent, Figs. 5, 7, 9) or does not contact the solder ball **24** over a substantial portion of the thickness of the sidewall (*see id.*, Figs. 16, 18).

Thus, the Greer and Tsuboi patent do not disclose every limitation of claim 27, and therefore applicants request that the 35 U.S.C. §102(e) rejections of claim 27 be withdrawn and the claims be allowed.

With respect to claims 28-33, which depend from claim 27 and recite additional features of the invention, applicants request that the rejection of these claims be withdrawn for the same reasons as note for claim 27, and that these claims likewise be allowed.

**New Claims 34-41**

New claim 34 has been added and recites, *inter alia*:

> "... a semiconductor substrate having at least one contact pad; a passivation layer provided on a surface of the substrate, the passivation layer having at least one opening to expose at least a portion of the contact pad; a seed layer ...an Under Bump Metal (UBM) layer ... at least one layer of solder material provided over the UBM layer, the solder material having a height; a polymer layer ... having a thickness less than said solder height; said polymer

contacting said layer of solder material over a substantial portion of the thickness of the polymer layer ...."

Neither the Greer or Tsuboi patents anticipates new claim 34 because neither discloses, teaches or suggests "... a polymer layer ... having a thickness less than said solder height; said polymer contacting said layer of solder material over a substantial portion of the thickness of the polymer layer ...."

Rather, in the Greer patent the conductive bump **310** does not contact the polyimide layer **302** at any point, but rather contacts the pad limiting metal layer **314**. (*See* Greer patent, Figs. 3 & 6). In the Tsuboi patent, a polyimide sidewall **16, 23** is disclosed that either does not contact the solder ball **24** (*see* Tsuboi patent, Figs. 5, 7, 9) or does not contact the solder ball **24** over a substantial portion of the thickness of the sidewall (*see id.*, Figs. 16, 18).

Thus, applicants believe that new independent claim 34 is allowable over the Greer and Tsuboi patents. With respect to claims 35-41 which depend from claim 34 and which recite additional features of the invention, applicants likewise believe that these claims are allowable for the same reasons as identified with respect to claim 34.

**35 U.S.C. §103(a)**

The examiner rejected claim 29 as unpatentable over the Greer patent taken with the Moyer patent. Claim 29 depends from claim 27, and thus contains all of the limitations of that claim.

As discussed previously, The Greer patent does not anticipate claim 27 because it does not disclose, teach or suggest a "... layer of polymer ... said polymer layer contacting said layer of solder material over a substantial portion of the thickness of the polymer layer ...." Rather, the Greer patent discloses a "pad limiting metal (underbump) layer **314** ... formed within the die coat opening" in the polyimide **302**. (*See* Greer patent, col. 4, lines 37-40 and Figs. 3, 6). Bump material, such as lead tin solder is deposited over the pad limiting metal layer **314** to form the conductive bump **310**. (*See id.*, col. 4, lines 59-63). As can be seen in Figures 3 and 6 of the Greer patent, the conductive bump **310** does not contact the polyimide layer **302** at any point, but rather contacts the pad limiting metal layer **314**. Applicants believe that the Morer patent does not resolve this deficiency, as it does not disclose, teach or suggest "a polymer layer ... said polymer layer contacting said layer of solder material over a substantial portion of the thickness of the polymer layer ...." Indeed the polymer layer **14** in the Morer patent serves as a capping layer for copper contact pad **13**

and does not contact the solder bump **42**. (*See* Morer patent, col. 2, lines 49-50 and Figs. 1-6B).

Thus, the Greer and Morer patents, taken alone or in combination, do not disclose, teach or suggest all of the limitations of claim 29. Applicants therefore request that the 35 U.S.C. §103(a) rejection of claim 29 be withdrawn and the claim be allowed.

In view of the foregoing amendments and remarks, Applicant submits that this application is in condition for allowance. Early notification to that effect is respectfully requested.

No fees are deemed due with this response, however , should any fees be required, the Commissioner for Patents is hereby authorized to charge any such required fees to deposit account **50-2061.**

Respectfully submitted,

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